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The Effect of Garlic *(Allium sativum)* Application to the Durability of Skipjack Fish Meat *(Katsuwonus pelamis)*

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Abstract
Background: *Health development towards healthy Indonesia 2010 are improving welfare, willingness and ability to live healthy for everyone to realize an optimal level of community health. Increasing the level of public health can be done through the handling of nutrition and protein in the community. This can be seen from the type or method of preserving food. Preservation through natural ingredients has relatively few side effects, one of which is the use of garlic for preservation. This study aims to determine the impact of Garlic (Allium sativum) on the Durability of Skipjack Fish Meat (Katsuwonus pelamis).*
Methods: *This study included a type of research true experimental with post-test only group design. The sample in the study was the meat of skipjack tuna which had been cleaned, then separated with the bone then divided with 100 grams of weighed bone. Then added garlic which has been mashed then considered 1 gram, 2 grams, 3 grams, 4 grams, and 5 grams as a durability test for skipjack fish meat.*
Results: *The addition of garlic (allium sativum) to the durability of skipjack fish obtained data on signs of physical damage to skipjack fish that did not use garlic after 1 x 12 hours with the average number of germs was $3.1x10^7$. Whereas in skipjack tuna using garlic at a storage time of 2 x 24 hours with a concentration of 1 gr / 100 g, the average is $3.1x10^7$, 2 gr / 100 g on average $2.7x10^7$, 3 gr / 100 g the average is $0.5x10^7$, 4 gr / 100 gr on average $0.8x10^7$, and 5 gr / 100 gr on average $1.2x10^7$.*
Conclusion: *there are differences in the number of germs on skipjack fish at each different concentration. However, the results of the study have not found the best concentration for use in preserving skipjack tuna meat. So it is recommended that another study is conducted regarding the amount of garlic concentration used for research.*
Keywords: *Garlic (Allium sativum), Durability, Skipjack Fish (Katsuwonus pelamis).*

Introduction

Health development towards a healthy Indonesia 2010 is to improve the welfare, willingness, and ability of a healthy life for everyone to realize an optimal level of public health. The implementation of health efforts is one of them is by securing food and drinks. One of the goals of food safety efforts is to ensure that the nutritional content and protein in the food does not change. Nutrition and protein, one of which is widely found in fish. These nutrients and proteins will still be contained in fish if the condition of the fish is still in good shape until when it will be consumed. Therefore, good and right handling is needed (Azwar, 2004).

According to Heruwati(2004), basic handling and processing of fish aim to prevent damage or decay. Handling that is widely carried out by the wider community is by using salt, namely by being made into salted fish.

Garlic can be used because garlic contains essential oils, which are antibacterial and antiseptic so they can be used to inhibit the growth of bacteria that cause fish damage. In addition to social and economic aspects, garlic is readily available in every household, because every family must use garlic as a cooking spice. Some people don't like colored foods, like foods preserved with turmeric. Turmeric will leave yellow on food ingredients, but garlic goes no color (Nurhim,2013).

In line with the above thinking, the author wants to research with the aim of knowing the level of resistance or durability of skipjack tuna (*Katsuwonus pelamis*) with the influence of garlic (*Allium sativum*). This study aims to determine the effect of Garlic (*Allium sativum*) on the Durability of Skipjack Fish Meat (*Katsuwonus pelamis*) in Karangmangu Village, Baturraden District, Banyumas Regency, 2008

Methods

According to its purpose, this study included a type of research *true experimental* with *a post-test only group design*. The sample in the survey was skipjack tuna meat used in this study.

The stages in this study were the meat of skipjack tuna which had been cleaned, then separated by the bone and then separated by weighing 100 grams of bone. Garlic that has been mashed is then weighed 1 gram, 2 grams, 3 grams, 4 grams, and 5 grams. Then 1 gram of garlic mixed with 100 grams of skipjack tuna, 2 grams mixed with 100 grams of skipjack fish, and so on. After everything is mixed, store the meat of the skipjack fish in a safe place. Organoleptic observation is done every 12 hours. After 4 x 24 hours, the number of germs on the skipjack fish will be checked. The test results were carried out in the data analysis phase of the study with statistical analysis with *one way* ANOVA which was used to determine the difference in the number of germs at each dose of garlic at a level of 10% correction ($\alpha = 0.1$) using data analysis software.

Results

In skipjack tuna meat that does not use garlic during the preservation, process odor has arisen during the first 12 hours. In the second 12 hours, the fish has caused signs of damage, namely unpleasant smell, soft meat, and when pressed with a finger leave marks. In skipjack tuna meat which was given 1 gram of garlic showed no signs of damage in the first 12 hours. Up to 12 hours the second and third of the fish meat has not shown any signs of physical harm. In the new 12th hour the skipjack fish meat showed a bad odor, but the flesh was not soft, when pressed with a finger it left no marks, and the color became pale.

The same physical characteristics were also shown in skipjack tuna meat which was given 2 grams, 3 grams, 4 grams, and 5 grams of garlic. Up to 12 hours the three types of meat had not shown signs of damage. On the fourth 12 hours, the meats emit a non-meaty odor, but the flesh is not soft, when pressed with a finger leaves a mark, and the color becomes pale.

Before giving garlic to the meat of skipjack fish, fresh tuna meat is examined first, the number of bacteria. The result of the examination is 29 x 10^3. The average number of germs on skipjack fish meat that does not use garlic (control) is $3.1x10^7$, at a dose of 1 gr / 100 g the average is $2.7x10^7$, at a dose of 2 gr / 100 g on average is $3.6x10^7$, at a dose of 3 gr / 100 g the standard is $0.5x10^7$, the treatment of 4 gr / 100 g averages $0.8x10^7$, and at a dose of 5 gr / 100 gr the average is 1,2 x $10^{\cdot}$ Giving garlic to the meat of skipjack fish in addition to affecting its physical characteristics also affects the number of germs on the flesh of the skipjack fish.

The room temperature obtained from the measurement results during the preservation process of skipjack tuna is divided into three times, namely morning at 07.00, noon at 12:30,

and evening at 19.30, the average in the morning is 22.75^0, the average during the day is 25^0, the average at night is 23.7^0, with a maximum temperature of 25^0C and the minimum temperature is 22.75^0C.

The humidity of the room obtained from the measurement results during the preservation process of skipjack tuna is divided into three times, that is morning at 07.00 noon at 12:30 a.m., and evening at 7:30 p.m. The average in the morning is 84.75%, the average during the day is 82.5%, the average at night is 85.75% The average is at morning is 84.75% the average during the day is 82.5%, the average at night is 85.75%, the maximum humidity is 87.75%, and the minimum moisture is 82.5%.

Based on the research that has been done, it can be seen that the average control is 3.1 $x10^7$ with a standard deviation of 1.62 $x10^7$, at a concentration of 1 gr / 100 gr. The average is 2.7 $x10^7$ with a standard deviation is 1.60 $x10^7$, at a level of 2 gr / 100 g. The average is 3.6 $x10^7$ with a standard deviation of 2.03 $x10^7$, at a concentration of 3 gr / 100 g. The average is 0.5 $x10^7$ with a standard the variance is 0.69 $x10^7$, at a concentration of 4 gr / 100 gr. The average is 0.8 $x10^7$ with a standard deviation of 1.52 $x10^7$, and at a concentration of 5 gr / 100 gr, the average is 1.2 $x10^7$ with a standard deviation is 1.59 $x10^7$. In the results above the significant value is 0.019. This means that at alpha 0.1 it can be concluded that there is a difference between skipjack meat that does not use garlic with skipjack tuna using garlic.

Discussion

Fresh fish meat has characteristics that are bright eyes, transparent cornea, black pupils, and convex eyes, gills red to deep red, bright, odorless, there is a natural mucus covering fish, clear, and smells typical according to fish species. The scales are durable, glossy with unique colors, covered with clear slime, and the abdominal cavity is clean and free of stinging odors. The texture of the elastic abdominal wall is springy without any color aberration, there is no smell of urine and the fish sink in the water, the incisions are bright and flexible, and when pressed there was no sign of finger marks (Afrianto,1989).

From the results of the study, it was found that the control group experienced odor changes occurred in the first 12 hours, while the structural changes occurred in the second 12 hours (1 x 24 hour). This is because the fish has suffered damage caused by mesophyll microorganisms. The temperature in the storage room for skipjack tuna ranges from 22^0C-25^0C. At a temperature of 25^0C mesophyll, organisms live and multiply so that the process of damage to food ingredients accelerates.

The dose group of 1 gram of garlic / 100 grams of skipjack tuna had a change of smell in the12 hours fourth. Similar changes also occur in other dose groups, namely a group of 2 grams of garlic / 100 grams of skipjack fish, 3 grams of garlic / 100 grams of skipjack fish, 4 grams of garlic / 100 grams of skipjack tuna, and 5 grams of onion white / 100 grams of skipjack tuna.

Changes that occur are changes in odor that begin to happen in the12 hours fourth. Changes that occur are odors that arise not the typical smell of fish meat, but the smell of garlic mixed with the scent of skipjack tuna meat. But the structure of skipjack tuna does not turn soft, when pressed with a finger also does not leave marks. Besides that, the color becomes pale, not as red as fresh fish meat. Possible changes occur due to changes in pH. Garlic contains acidic nicotinic acid, which changes the meat that was brightly colored (red), becomes pale and the color is not attractive (Clucas,1981).

Good meat, one of which is fulfilling the number of germs. According to the Decree of the Director General of POM, number: 03726 / B / SK / VII / 59 concerning the maximum limit of microbial contamination in food, the total plate limit for fresh fish is 10^7/ gram. The amount of microbial contamination must not exceed the predetermined number because if the number of microbial contamination exceeds that number if consumed, it can cause health problems.

The number of germs seen from the average, the lowest number is the concentration of 3 gr / 100 g, which is $0.5x10^7$, whereas the limit for the number of germs is 10^7. This number is not much different from the number of bacteria in the control that is $3.1x10^7$. This shows that the figure exceeds the threshold amount of contamination of microorganisms in food. This means that less garlic can be used to preserve skipjack tuna meat for 2 x 24 hours. According to Bremmer(2002), the number of germs that exceeds the threshold is caused by several factors, including the determination of less accurate doses. The decision of this dose will affect the workability of garlic in preserving skipjack tuna meat, including by reducing the number of germs. Antibacterial substances contained in garlic are possible in low amounts so that in doses of 5 grams for 100 grams of skipjack fish is not efficient enough to reduce the number of germs to be more durable.

In addition to the determination of the dose that is less accurate, other things that affect the number of germs that exceed the threshold are six principles of sanitation hygiene, because in this study only cover the preservation of food ingredients, eating from six hygiene hygiene principles just used two principles, namely food safety and storage of foodstuffs.

Poor storage can also affect the number of germs. Storage in an open place makes it easy for flies and other insects to land and attach microbes to the meat, so storage must be correct. Storage carried out at the time of the study was stored on a table using a food hood, so that no flies or other animals perched on it (Kanoni,1991).

Storage temperature is one of the factors that must be considered during the storage process because it will affect the growth process of microorganisms that are in food ingredients or the fish's body. Based on the optimum temperature for growth, microorganisms can be classified into three groups, namely the class of psychrophilic microorganisms, mesophilic microorganisms, and thermophilic microorganisms (Sanfer,2010).

Based on the room temperature range during the process of preserving skipjack tuna which ranged between 22^0C-25^0C, mesophilic microorganisms can live and reproduce well, because the temperature of 25^0C is the optimum temperature for the growth of mesophilic microorganisms. While thermophilic microorganisms become inactive because they are in a temperature environment that is lower than the optimum temperature for growth. Microorganisms psychrophilic will die at this temperature because the temperature is higher than the optimum temperature for growth.

Decay or damage to the meat of skipjack fish is also due to the influence of the enzymes contained in fish meat which are very active. In cold fish storage, it can be done by storing at an ideal temperature between 0-4^0C for five days. Fish stored at 0-4^0C for more than five days will produce a foul odor as a sign of decay.

In cold temperature storage, microorganisms that will live are microorganisms psychrophilic, because these microorganisms are in the optimum temperature environment for growth. Whereas mesophilic bacteria will become inactive because they are in a temperature environment that is lower than the optimum temperature to be able to live and reproduce. Thermophilic microorganisms will die because the temperature is lower than the optimum temperature for growth (Afrianto,2015).

Based on observations made during the preservation of skipjack fish meat, the room temperature of the skipjack fish meat storage during the preservation process ranged from 22^0C-25^0C. This means mesophilic microorganisms can live and multiply in the flesh of the skipjack fish and will cause damage to skipjack fish.

Damage to food, including damage to skipjack fish, is caused by several factors, namely the food factor itself and the environment in which the food is located, including water content. In the fish meat around 70% -80% of the weight of meat is water. Besides, naturally in the flesh of skipjack fish also contains enzymes that can decompose proteins, so that sometimes if there is decay arises

unpleasant odor. Therefore, fish are included in perishable food, are soft, and do not withstand collisions or pressure (Made Astawan, 1999).

Food ingredients derived from fish are generally a food source that is high in protein and fat content so that these food ingredients are easily decomposed because it is suitable for breeding and microbial growth. To prevent the growth of microorganisms such as by cooling, smoking, salting, and in this study tried by giving garlic containing anti-ingredients bacterial (Idler,1998).

Besides, in the body of a fish that has died there will be metabolic reactions or enzymes that are very high in an activity that occurs naturally. Damage to fish is caused by the depletion of fish muscle glycogen supplies, causing anaerobic metabolism which causes damage to fish meat. Damage to fish meat is also caused by the loose structure of fish meat so that microorganisms are easy to enter and cause damage to the fish meat. Supported with optimum growth temperatures, damage to the fish meat will occur faster (Purwani,2009).

According to Genigeorgis(1985), the humidity of the storage room is one of the factors that must be considered during the process of storing fish meat. Moisture in the storage room should not be too high and not too low. If the humidity of the room is too high, it will cause the condition of the room to become wetter, so that this condition will accelerate the damage or decay in fish meat. If inside the room where the fish preservation process is carried out the humidity is quite low, then the room will become quite dry so that it will accelerate the process of water evaporation. Thus, if water evaporation occurs during the preservation process, then the freshness of the skipjack meat will be reduced. In the method of preserving skipjack tuna, based on the measurements of air humidity, the results showed that the moisture in the room ranged from 82.5% to 87.7%. Judging from the humidity figure, the storage room for skipjack fish during the preservation process has fulfilled the Minister of Health Regulation No. 712 / Menkes / Per / X / 1986 that the humidity of the storage room during the preservation process of skipjack tuna has fulfilled the requirements.

Based on the results obtained there are different differences between the control group and the treatment group. Based on the column, it can be seen that the group is meaningful at concentrations of 2 gr / 100 g and a concentration of 3 gr / 100 g. The concentration of 2 gr / 100 g of significance was 0.064, and at a concentration of 3 gr / 100 g, the significance was 0.064. Thus it can be concluded that alpha 0.1 there is a difference in the concentration of 2 gr / 100 g with a concentration of 3 gr / 100 gr. This means that Ho is rejected and Ha is accepted. These differences exist even if not significantly. Although there is a difference in the two concentrations, if we see the number of germs, the average of each concentration of the number of bacteria exceeds the threshold value of 10^7/ gram.

Conclusion

The appearance of signs of physical damage to skipjack fish that do not use garlic is after 1 x 12 hours. The average number of germs in fresh tuna meat that does not use garlic is $3.1x10^7$. In alpha 0.1 there was an effect of garlic on the durability of skipjack fish meat with a concentration of 2 gr / 100 gr and 3 gr / 100 gr. In an organoleptic storing time of 2 x 24 hours, there were differences in physical characteristics seen between skipjack tuna meat that did not use garlic and those using garlic. The number of germs on skipjack fish meat that uses garlic at a storage time of 2 x 24 hours with a concentration of 1 gr / 100 g on average is $3.1x10^7$, 2 gr / 100 g on average $2.7x10^7$, 3 gr / 100 g averaging $0.5x10^7$, 4 gr / 100 gr on average $0.8x10^7$, and 5 gr / 100 gr on average $1.2x10^7$. There are differences in the number of germs on skipjack fish at different concentrations. Based on the results of the study, it was found that the best concentration was not found to be used in preserving skipjack tuna.

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